COUNCIL OF ATHABASCAN TRIBAL GOVERNMENT

GWITCHYAA ZHEE UTILITY CO.

FORT YUKON WOOD ENERGY

PROGRAM-WOOD BOILER DEPLOYMENT AK

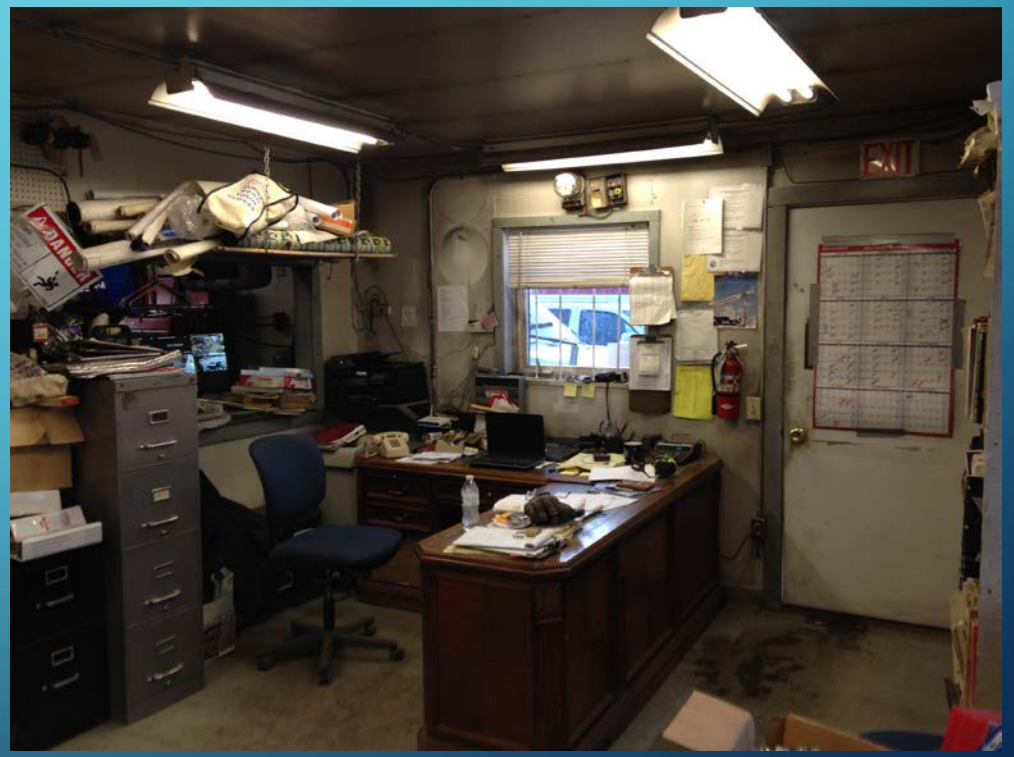
2016 DOE PROGRESS REVIEW TRIBAL RENEWABLE ENERGY

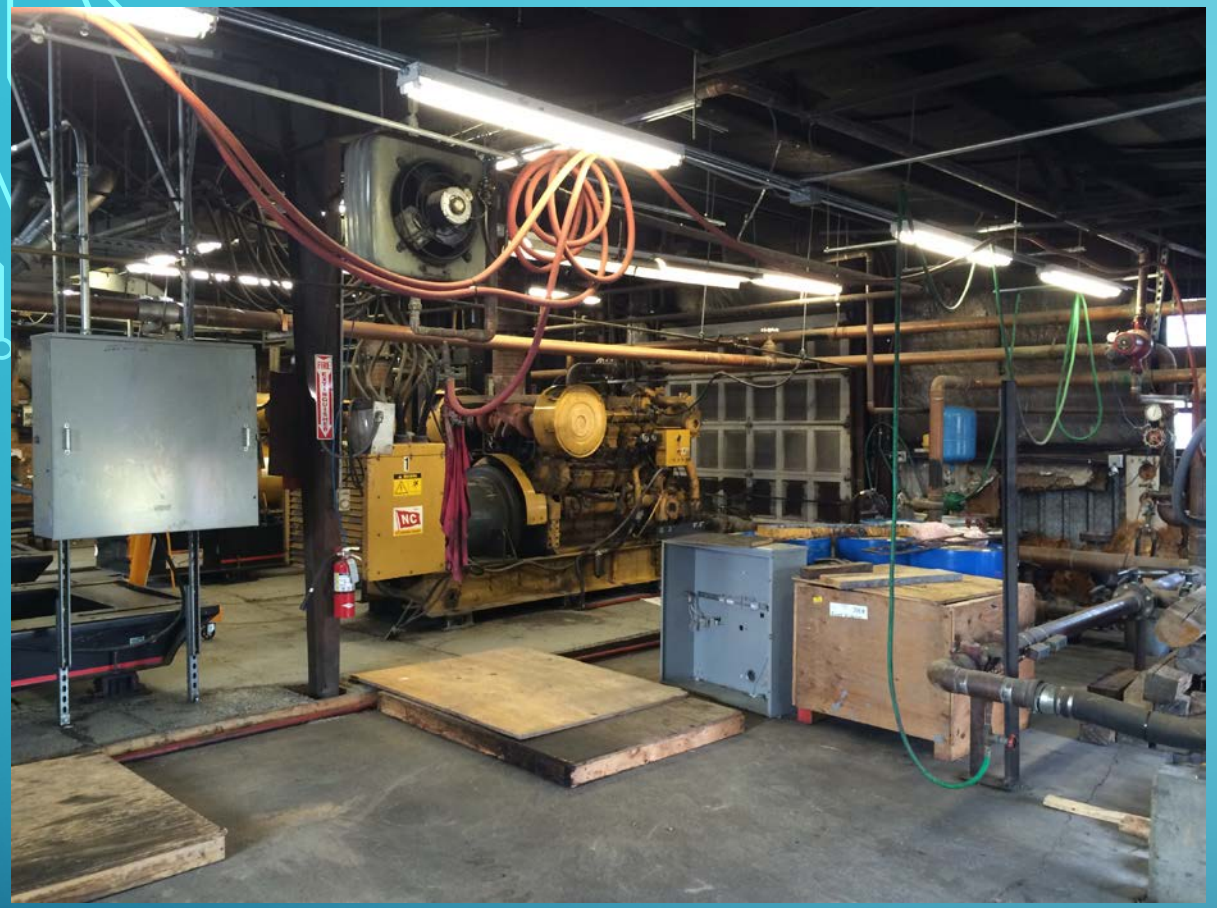
PRESENTERS: JAMES KELLY, CATG FRANNIE HUGHES, GWITCHYAA ZHEE CORPORATION/ UTILITY CO.

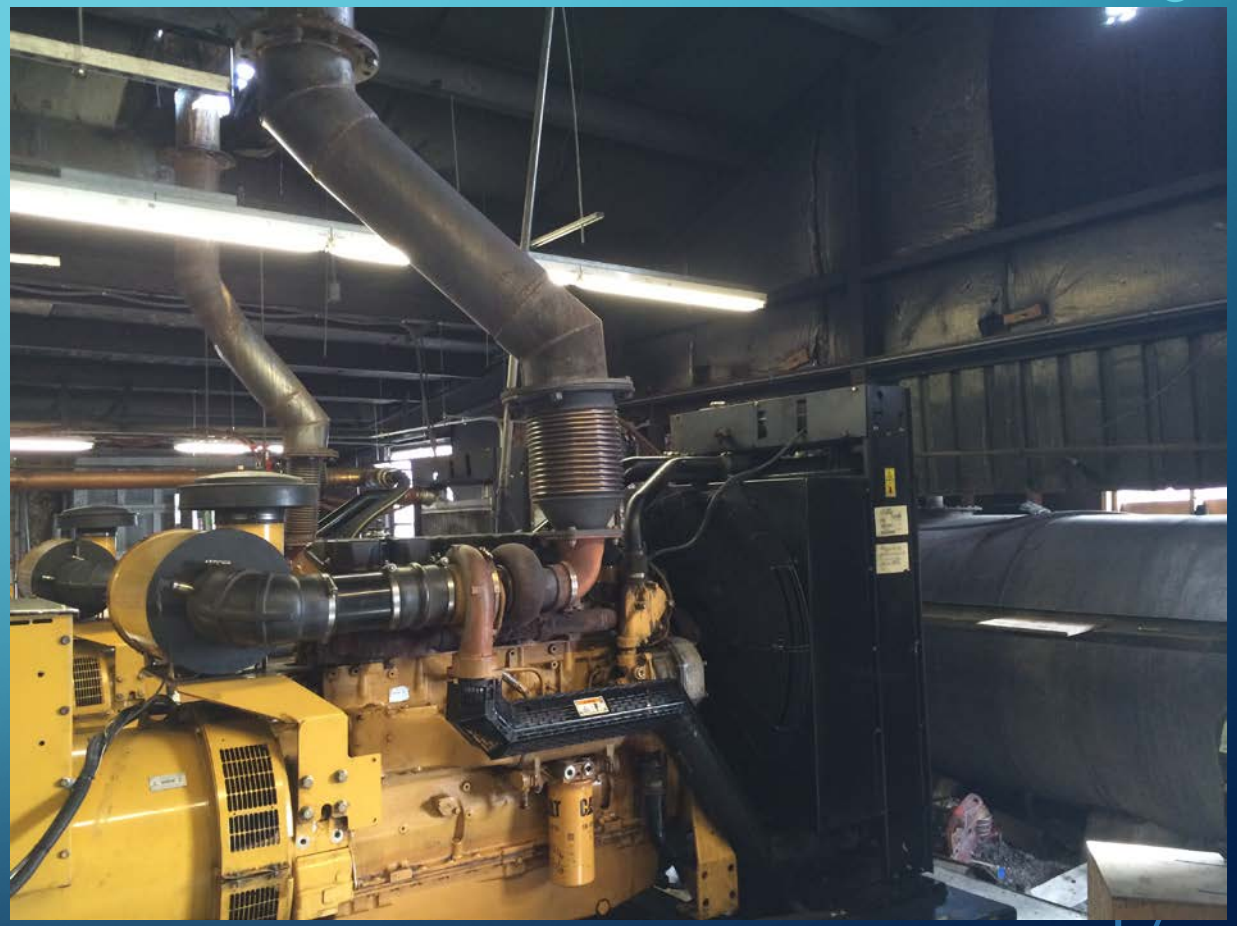
FORT YUKON WOOD ENERGY PROGRAM WOOD BOILER DEPLOYMENT

- SOW: construct a wood boiler and district heating system in Fort Yukon, AK
- Our DOE grant was initiated in 2008, to harvest willows for stand-alone boilers
- The concept to combine local resources together, our village elected to work on replacing our existing diesel generator power plant with a combined heat & power project.
- This DOE grant: Wood Boiler Deployment evolved into our CHP, the Wood Chip Boiler will heat a District Heat Loop combined with Waste Heat.

PROJECT LOCATION: FORT YUKON, ALASKA
FORT YUKON WOOD ENERGY PROGRAM
EXISTING POWER PLANT







The Yukon Flats, the interior of Alaska , Fort Yukon , is located on the Yukon River. We are just below the upper mouth of the Porcupine River.

SPRING 2015- CHP CONSTRUCITON START DATE

- Our project first construction set back; Porcupine River Flood- the May flood filled our only gravel quarry.

This was a crucial set back for our project as we planned the CHP Pad construction as soon as the Yukon River was navigable. Due to the large volume of water and high water table, a new gravel pit was needed; with the support of Doyon and GZU & Tribal staff, potential gravel sites were explored in the remaining May & June.

- OPTIONS FOR DEWATERING THE PIT WERE EVALUATED. A SURVEY OF THE WATER DEPTHS OF THE FLOODED PIT WAS PERFORMED BY MANLEY LAND SURVEYORS IN JULY, WHO WERE ON SITE COMPLETING THE CHP REPLAT. THE SURVEY DISCLOSED THE VOLUME OF WATER IN THE PIT EXCEEDED 40-MILLION GALLONS, AND THE WATER TABLE AT THE PIT WAS 2-FEET BELOW THE SURFACE OF THE FLOODED PIT.
- BASED ON THIS INFORMATION A PREFERRED GRAVEL SITE WAS SELECTED ADJACENT AND WEST OF THE EXISTING FLOODED PIT. A GEOTECHNICAL INVESTIGATION WAS CONDUCTED BY GOLDER AND ASSOCIATES TO ASSESS THE QUANTITY AND QUALITY OF GRAVEL AT THE SITE. THE INVESTIGATION FOUND GOOD GRAVEL AND VERIFIED THE SITE WAS NOT AFFECTED BY THE FLOODWATERS AT THE ADJACENT GRAVEL PIT.
- WE WERE FINALLY ABLE TO HAUL GRAVEL IN AUGUST 2015, COMPLETE THE PHASE I OF THE CHP PAD, **MID OCTOBER 2015**.

August 2015

Construction Phase 1: Gravel Pad

Clearing Gravel Site, Grubbing

Clearing-Developing New Gravel Source

More site clearing

Pushing up over burden

Gravel Hauling starts…

New CHP site


CAT


STOP


CAT
NC
D4G


CAT
NC
D4G

End of CHP Pad Phase 1 October 2015

June 2016, as pad sat over the winter to settle, now to begin work to complete the pad construction.


CAT
924G

Construction Phase 2: Northern Management Services, contractors, begin foundation work June 2016 as our crew worked on the district heating system.

Notice, with climate change , we now understand the need to insulate foundation work, this keeps the permafrost intact.

FOUNDATION WORK COMPLETED, NOW THE BUILDING CONSTRUCTION BEGINS:


NO
TRESPASSING
CONSTRUCTION AREA
AUTHORIZED PERSONNEL ONLY
VISITORS REPORT
TO OFFICE

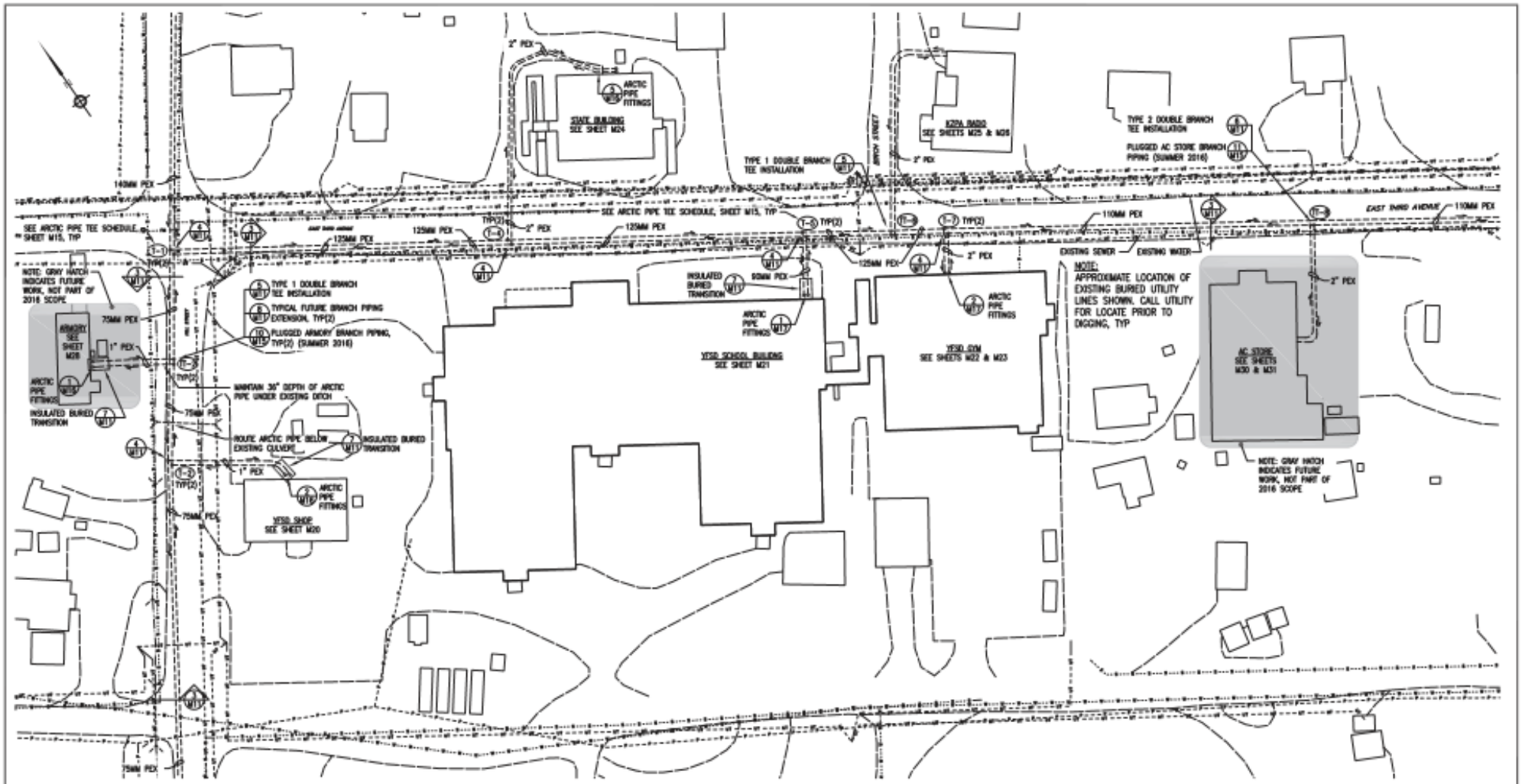
Building Construction finished September 2016

Current SOW:

electrical

welding & fabrication

CHP DESIGN DRAWINGS:



1 M12 CENTER AREA ENLARGED SITE PLAN

District Heat System Route on East 3rd

ISSUED FOR CONSTRUCTION
JUNE 2016

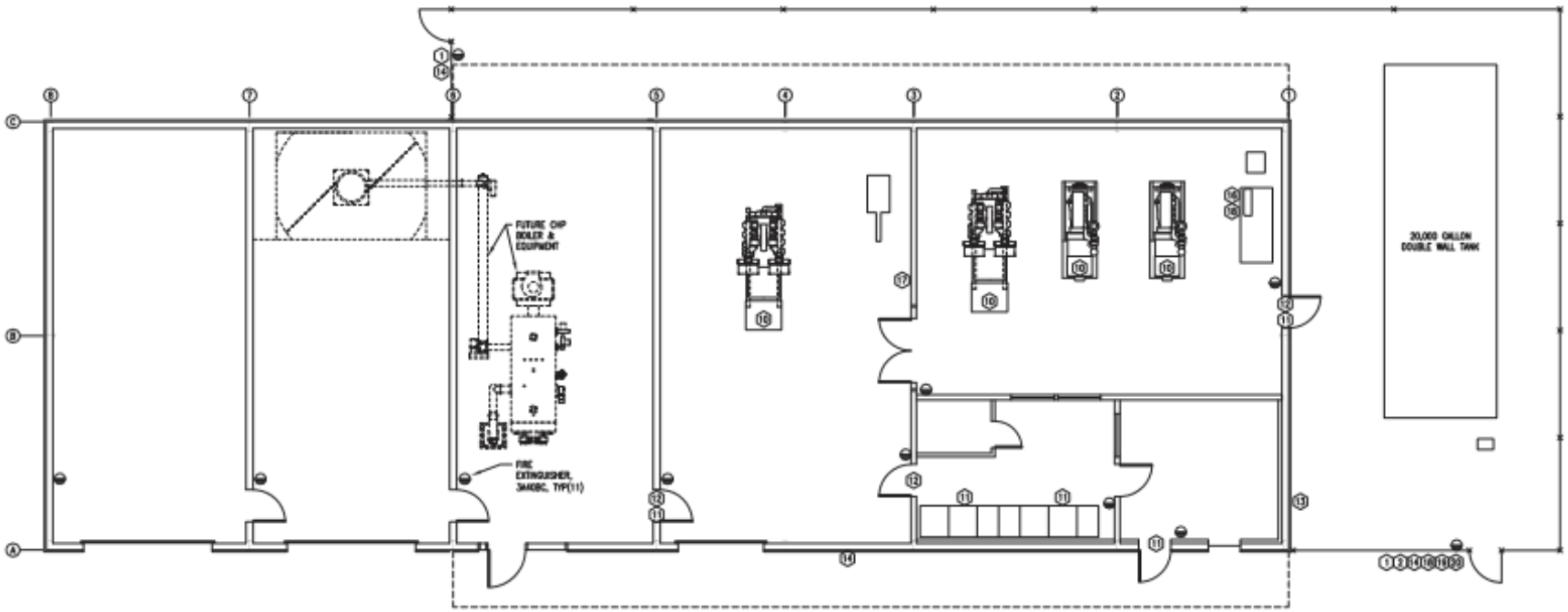
PROJECT: FORT YUKON CHP & BIOMASS PROJECT

TITLE: DISTRICT HEATING SYSTEM
CENTER AREA ENLARGED SITE PLAN

Gray Stassel Engineering, Inc.

FILE NAME: FYU M10-M17

SHEET: M12



1 M3.0 CHP PLANT FIRE EXTINGUISHER & WARNING SIGN/PLACARD PLAN 1" = 8'-0"

WARNING SIGN & INFORMATIONAL PLACARD SCHEDULE:

10"x14"x0.08" ALUMINUM, 3/16" HOLES IN ALL FOUR CORNERS. WHITE NON-REFLECTIVE VINYL BACKGROUND, 3M 3650-10, WITH 3M SERIES 225 HIGH PERFORMANCE VINYL LETTERS, COLOR AS INDICATED, ONE SIDE ONLY. DECALS IDENTICAL EXCEPT PROVIDE ALUMINUM BACKING PLATE. WARNING LITES OR EQUAL.

WARNING SIGNS – RED LETTERS ON WHITE BACKGROUND.

1. "DANGER – FLAMMABLE, NO SMOKING" (3" HIGH 1/2" STROKE LETTERS – 24"x18")
2. "ATTACH STATIC WIRE AND VERIFY TANK CAPACITY PRIOR TO FILLING TANK"
10. "CAUTION: THIS UNIT STARTS AUTOMATICALLY, LOCK & TAG OUT PRIOR TO SERVICE"
11. "DANGER HIGH VOLTAGE, AUTHORIZED PERSONNEL ONLY"
12. "CAUTION HEARING & EYE PROTECTION REQUIRED"
13. "FUEL OIL DAY TANK ALARM"
14. "IN CASE OF FUEL SPILL CALL DEC 1-800-478-9300"

INFORMATIONAL PLACARDS – BLACK LETTERS ON WHITE BACKGROUND.

16. "TO MANUALLY FILL DAY TANK IN CASE OF EMERGENCY:
    1) TURN OFF POWER TO THE DAY TANK CONTROL PANEL
    2) MANUALLY OPEN ACTUATOR VALVE AT INTERMEDIATE TANK USING A WRENCH
    3) OPEN NORMALLY CLOSED VALVE BY HAND PUMP
    4) OPERATE HAND PUMP WHILE MONITORING LEVEL GAUGE"
17. "TO CHANGE ENGINE OIL:
    1) LOCK & TAG GENERATOR OUT OF SERVICE
    2) OPEN NORMALLY CLOSED DRAIN VALVE AT GEN
    3) PUMP OUT ENGINE OIL INTO BARREL
    4) CHANGE FILTER
    5) CLOSE DRAIN VALVE & REFILL ENGINE
    6) RUN ENGINE, SHUT OFF, & CHECK DIPSTICK
    7) TOP OFF & PLACE ENGINE BACK IN SERVICE"
18. "CHECK INTERMEDIATE TANK LEVEL DAILY, FILL WHEN BELOW 5'-6"
19. "CLOSE AND LOCK MAIN FILL VALVE AFTER EACH TRUCK DELIVERY"
20. "TANK IS EQUIPPED WITH FILL LIMITER TO SHUT OFF FUEL AT 95%"

INSTALLATION – SECURE EACH SIGN TO WALL OR DOORS WITH STAINLESS STEEL SCREWS.

NOTE: SEE FIRE SUPPRESSION PLANS AND SPECIFICATIONS FOR ADDITIONAL PLACARDS TO BE PROVIDED WITH FIRE SUPPRESSION SYSTEM. INSTALL ALL SIGNS AS INDICATED.

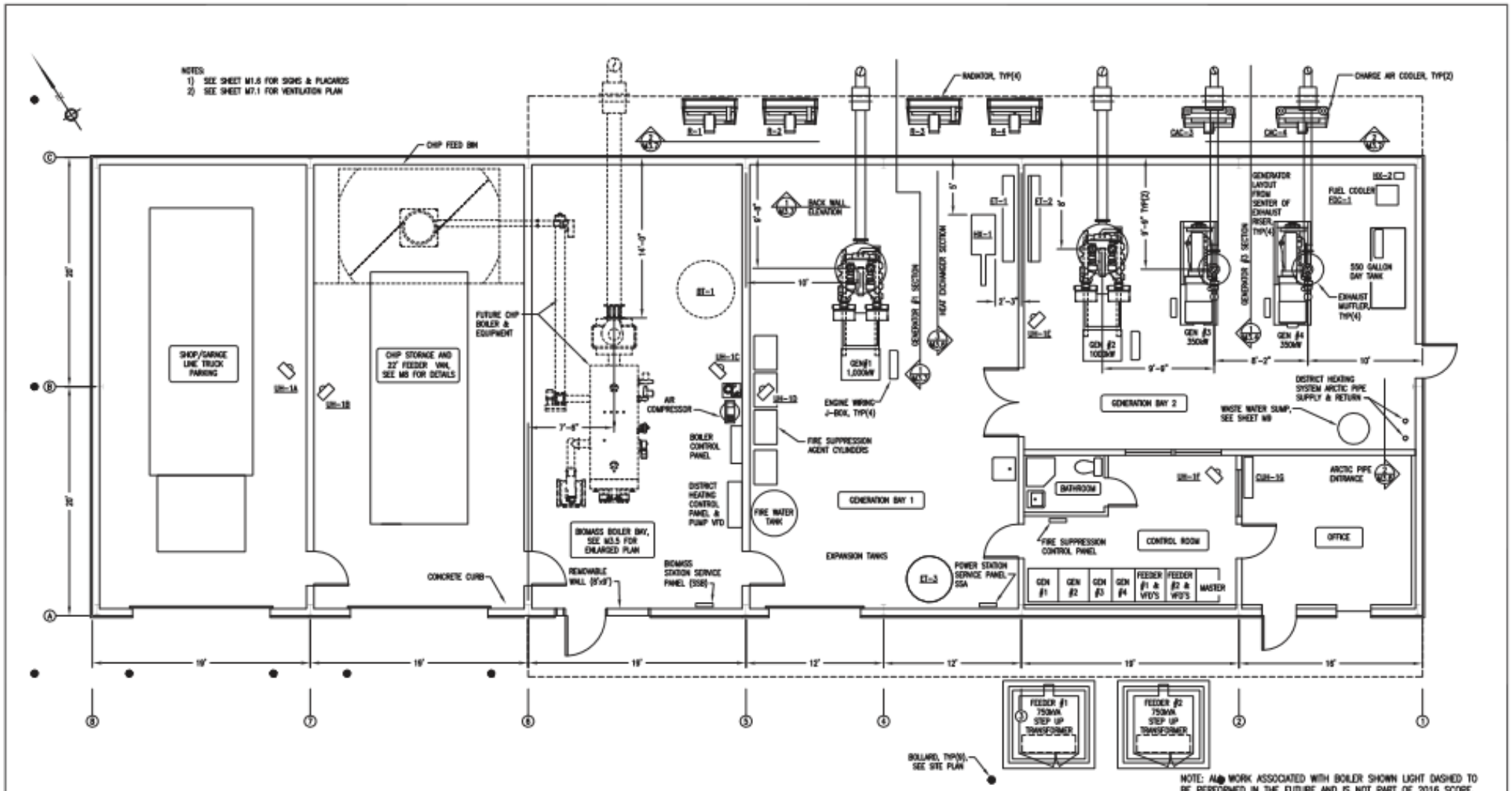
ISSUED FOR CONSTRUCTION JULY 2016

PROJECT: FORT YUKON CHP & BIOMASS PROJECT

TITLE: CHP PLANT
FIRE EXTINGUISHER, WARNING SIGN & PLACARD PLAN

Gray Stassel Engineering, Inc.

DRAWN BY: RGP | SCALE: AS NOTED
DESIGNED BY: BCD | DATE: 7/28/16
FILE NAME: FYU CHP M3-M8 | SHEET: M3.0
PROJECT NUMBER:



1 M3.1 CHP PLANT LAYOUT
1/4" = 1'

ISSUED FOR CONSTRUCTION
JULY 2016

PROJECT: FORT YUKON CHP & BIOMASS PROJECT

TITLE: CHP PLANT LAYOUT

Gray Stassel Engineering, Inc.

DRAWN BY: MJP | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 7/26/16
FILE NAME: FYU CHP M3-M8 | SHEET: M3.1
PROJECT NUMBER:


KÖB
PYROT

Kob Pyrot Boiler: *Benefits at a Glance*

- High efficiency with advanced combustion technology, triple-pass heat exchanger and modulating output control (turndown ratio 4:1).
- Maximum heat transfer with triple-pass heat exchanger design.
- High efficiency and ultra-low emissions with precisely controlled primary and secondary air.
- Automatic ignition device limits idling and saves fuel.
- Low maintenance with fully-automatic deashing, optional pneumatic cleaning system and flue gas deduster.
- Advanced safety equipment ensures safe and reliable operation.
- Custom design of your system by our team of experts.

CHP- COMBINED HEAT POWERHOUSE

<u>District Heat Loop captures:</u>

-Waste Heat from diesel generators

-Biomass boiler

CHP/ BIOMASS PROGRAM BENEFITS

- Energy Cost Reduction-Displace Fossil Fuel
- Improve Environmental & Health Issues
- Habitat Enhancement
- Wildfire Mitigation
- Improves Local Economy

TO MOVE FORWARD CHP/BIOMASS PROGRAM

- Update sustainable 5-year harvest plan & support structure
- Wood harvest, transportation and delivery planning
- District heat system design includes wood delivery and storage system functions
- Harvesting permitting processes- Global warming is a concern-winter harvest
- Boiler operations functioning
- Training & capacity building functioning
- Feed the boiler

BOILER SYSTEM

- Chip Fired 1600-2000 tons per year @ $175/ton
- Displace 67,000 Gallons per year @ 7 buildings
- 14 year payback @ $4/gallon
- 6.5 year payback @ $6/gallon

ACREAGE HARVESTED FOR HEATING

- 2,000 tons / year heat
- 25 tons/acre
- 40 year rotation
- 80 acres / year
- 3200 acres / rotation
- Historical wildfire events have burned 80,000 acres in one month
- Global warming-changes 2016

  no wild fires, as a rainy season

AS BUILDING CONSTRUCTION CONTINUES, THE DISTRICT HEAT LOOP INSTALLATIONS:

STARTED LAYING PIPE FOR THE HEAT LOOP AT CITY WATERHOUSE - NOTE THE HEAT EXCHANGE PIPE. W/ GLOBAL WARMING CONCERNS WE INSTALLED THE HEAT LOOP ABOVE THE EXISTING INFRASTRUCTURE.

THE TRENCH ROUTE ON E. 3RD AVE FOR DISTRICT HEAT LOOP

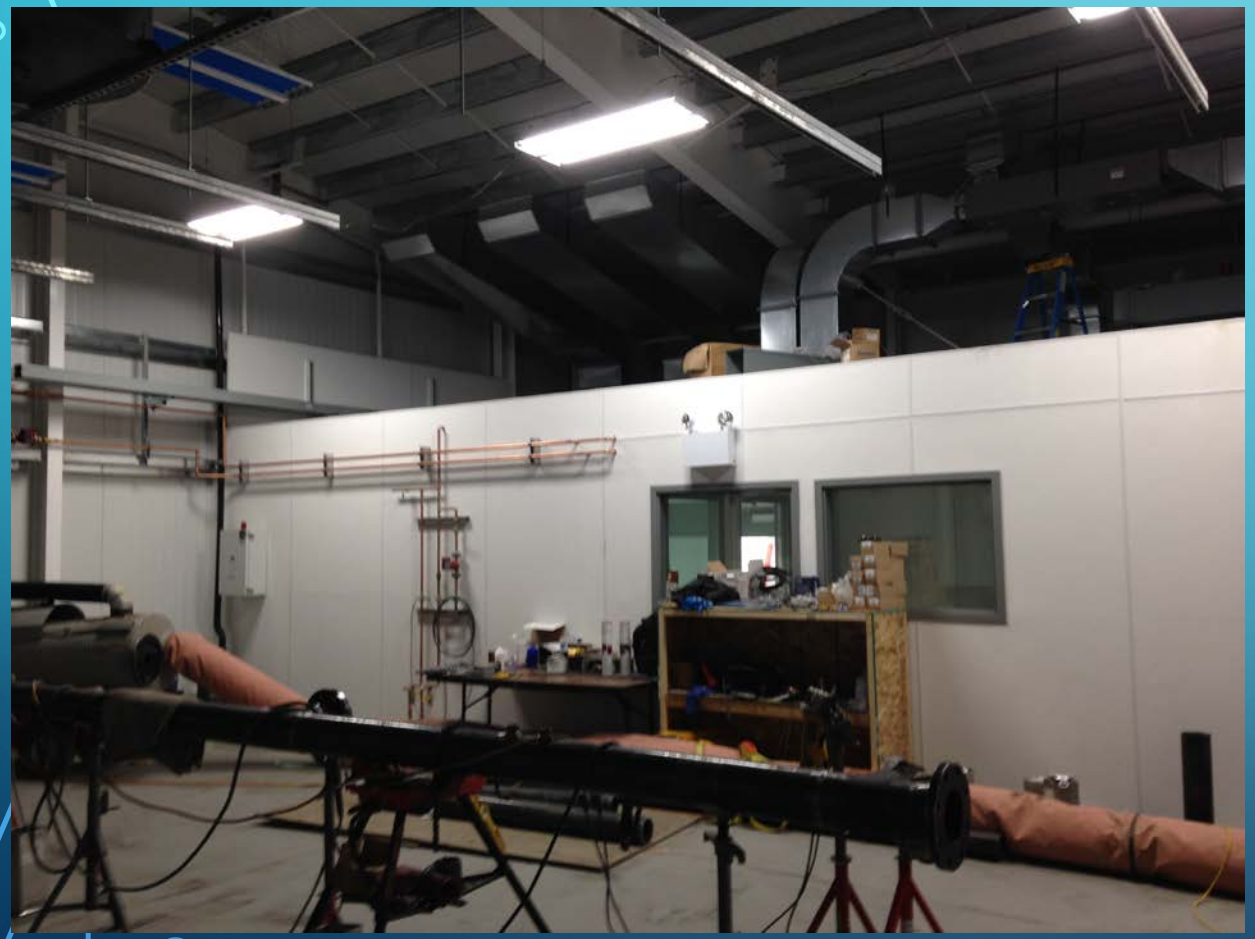
WORK AT THE STATE BUILDING

YUKON FLATS SCHOOL DISTRICT MAINTENANCE BUILDING

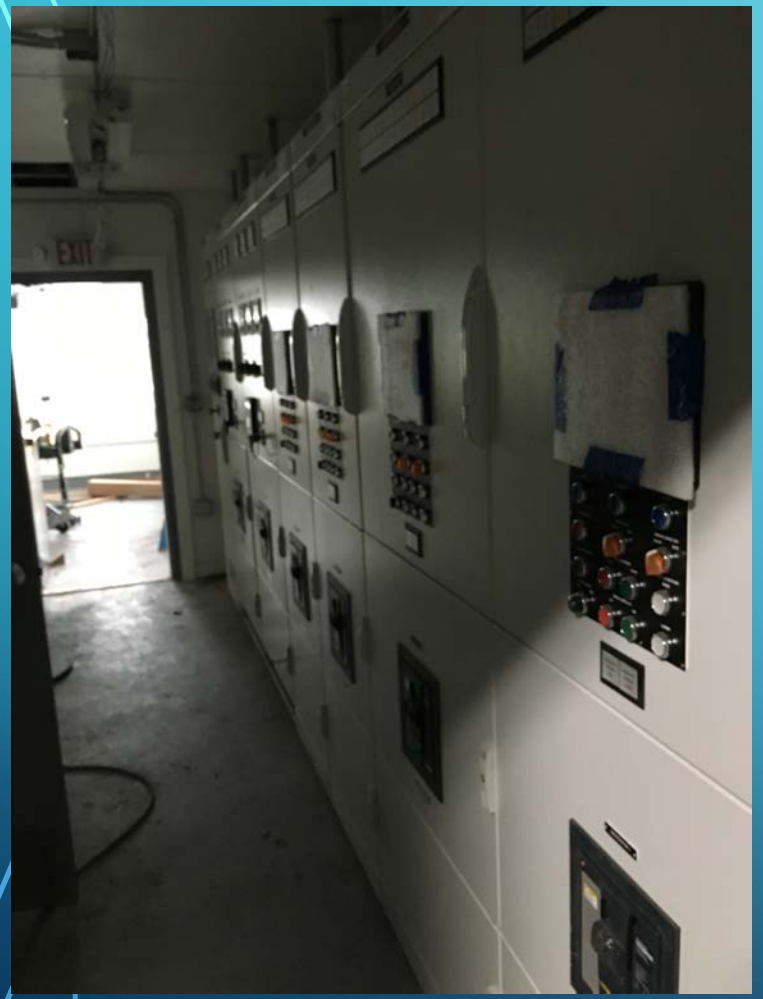
FINAL HEAT LOOP ROUTE TO THE NEW CHP BUILDING

OCTOBER 2016 CHP INTERIOR INSTALLATIONS

CHP OFFICE & CONTROL PANEL ROOM



Control Panel Room & Generator Room



CHP WILL BE ONLINE FEBRUARY 2017

WASTE HEAT WILL BE CIRCULATING THROUGH THE DISTRICT HEAT SYSTEM AT 25% FUEL SAVINGS UNTIL SEPTEMBER 2017, WHEN THE BIOMASS BOILER IS ON LINE.

ACKNOWLEDGEMENTS

- Council of Athabascan Government (CATG)
- Department of Energy, Office of Indian Energy (DOE)
- Gwitchyaa Zhee Corporation (GZC)
- AEA
- USDA RUS
- Denali Commission
- Gwichyaa Zhee Gwich'in Tribal Government(GZGTG)